Invertebrata

Tasmania's Invertebrate Newsletter

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Deadline

for the July *Invertebrata*
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Invertebrata is produced by the Queen Victoria Museum and Art Gallery, Launceston, Tasmania.

We publish articles and short notes on all aspects of invertebrate biology and conservation in Tasmania.

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The Ballad of Little 'Al'

In a fauna dominated by oddness, the genus *Allocharopa* are the Norms of the Tasmanian snail world. At first glance, they're small drab flat yellowish things, absolutely typical of their family (Charopidae, which includes 47 of Tasmania's 80 known native land snails). Furthermore, they're very common, and they're everywhere in Tasmania except Flinders Island. Being small, fiddly to work with and glamourless, they haven't received much attention. One or two species have been recognised, depending on whom you listen to.

This changed last January when I collected several *Allocharopa* from Pine Landing on the Gordon River, and found that they fell into two distinct groups, so different that they could not possibly be the same species. While I initially picked the wrong group as being the new species (oops!) the result was that I soon looked at *Allocharopa* in much more detail.

There's not much detail to look at (since they are all so similar and small, and only a masochist would dissect more than a handful) but by working on shell features I was able to make progress. By measuring hundreds of specimens on some very basic features and graphing them, I noticed unusual gaps and groupings in what had previously seemed like 'just one variable species'. Suddenly, there were lots.

The different species (at least five) provide an intriguing biogeographic pattern. *Allocharopa legrandi*, the most widespread, co-exists happily with three of the others within their ranges, but avoids the extreme northwest tip of the State, the Hunter Group and King Island, and is replaced in these areas by *A. tarravillensis*, yet another cross-Bass-Strait 'toehold' species.

Allocharopa kershawi, which is widespread in eastern Tasmania, extends south to Hobart's eastern shore, and just makes it onto a few western shore dry hills (e.g. Knocklofty and Barossa Hill) before being replaced by another species, which is probably undescribed. One question here is how long the western shore *A. kershawi* have existed surrounded by a deep, wide river on one side and a potential competitor (with slightly different habitat preferences) on all others.

The undescribed species has mysteries of its own. It's very common in the Wellington Range and southwards to Cygnet, but skips most of the Southern Forests, recurring at Moonlight Ridge in the very far south. The same species, or a limestone endemic that looks identical? Further study may tell.

Another undescribed species, a pretty streaky brown thing that looks like polished wood under the microscope, is found in western Tasmania. This species has a simplified structural pattern on the shell, suggesting it isn't actually an *Allocharopa* at all, but something else which looks like one but is not even related.

These snails may also interact with other Tasmanian snails. The most important of these is '*Discocharopa*' *vigens*, an obscure snail known from a few localities near Hobart and now possibly close to extinction. It is larger and flatter than *Allocharopa* but appears to be closely related. In 1990, I recorded *vigens* from a site on Grass Tree Hill. Eleven years later, the site having been burnt in 1993, *vigens* is nowhere to be found, but the hardy *kershawi*, not before seen in the area, has moved in.

Invertebrate species are often more likely to be studied if they are large, showy and scarce. With these snails, as is so often the case, the seemingly small, drab and common members of a group aren't quite as boring as they seem.

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Editorial

Some of Tasmania's loveliest invertebrates are marine molluscs. Until recently the best reference to consult for a look at these creatures was the 'Bible' of local marine naturalists:

Edgar, G.J. 2000. *Australian marine life. The plants and animals of temperate waters (revised edition).* Sydney: Reed New Holland; 544 pp. ISBN 1-876334-38-X.

The cover of Graham Edgar's book shows *Tambja verconis*, a polycerid nudibranch. This particular animal gets my vote for Most Drop-Dead Gorgeous Local Invertebrate of this or any other year.

There are now a number of websites where the incredible colours and patterns of our sea slugs can be appreciated. Most of these sites are linked to one maintained by Bill Rudman of the Australian Museum:

www.seaslugforum.net

For yet more molluscan marvels, see the beautifully illustrated new book by Mark Norman and Mandy Reid:

Norman, M. and Reid, A. 2000. *A guide to squid, cuttlefish and octopuses of Australasia.* Collingwood (Vic.) the Gould League of Australia and CSIRO Publishing; 96 pp. ISBN 0-643-06577-6.

* * *

'Little Pine duns have begun to emerge properly at last.'

(Fishing column, *The Examiner*, 1 February 2001)

Anglers are keen observers of (selected) Tasmanian invertebrates, and you can learn a fair bit from the news that anglers bring back from their streams and lakes. In the column quoted above, writer 'Brown Dun' notes a big fall of gum beetles on Lake St Clair, then says,

'Running very high and with mayfly numbers dwindling, Brumbys Creek seems to be in between hatches. Although spinners show occasionally and duns continue to drift down, there aren't enough here to prompt steady feeding. It's a similar story downstream on the lower Macquarie River, but things will change for the better in a week or two when fish start looking in earnest for the grasshoppers now becoming thick in patches.'

I wonder if published observations like these have ever been compiled for research purposes. Fishing gossip in the newspapers may be informal, but over the years it's likely to have shown the highs and lows in the lives of insects eaten by trout in Tasmania. These spatial and temporal patterns are probably not recorded elsewhere, and a long, leisurely browse through the angler's columns could be a profitable, if tedious form of data-mining.

Conferences

Society of Australian Systematic Biologists
and Australasian Evolution Society
16 – 18 July 2001
University of Melbourne and Museum Victoria
www.museum.vic.gov.au/about/conferences/sasb2001.htm

This joint conference will include contributed papers and plenary sessions with speakers from both societies. Papers are encouraged from across a wide spectrum of systematics and evolutionary biology, and the program will be interdisciplinary wherever possible. The following special seminars and workshops are planned:

Short-range endemism in the Australian biota

Convenors: Mark Harvey, mark.harvey@museum.wa.gov.au, Liz James, ejames@rbgmelb.org.au. Short-range endemics are known in many Australian taxa, including trap-door spiders, scorpions, millipedes, molluscs, freshwater crayfish and insects, frogs, orchids and many other vascular plant groups. The phenomenon is real (not an artefact of incomplete sampling), and both flora and fauna elements display concordant distribution patterns. The historical processes that have generated these distribution patterns, and the implications of short-range endemism for conservation and natural resource management, are two recurring themes. It is planned to publish botanical and faunal papers in special issues of *Australian Systematic Botany* and *Invertebrate Taxonomy*. Potential contributors should contact the convenors.

Opportunities for digital publishing of systematics

Convenor: Robin Wilson, rwilson@museum.vic.gov.au. In Australia, a large fraction of systematic papers are published by state museums, herbaria, Royal societies, and similar small, non-profit publishers. Many of these publishers do not have the resources to provide full Internet access to their journals. A workshop is planned involving key stakeholders, to explore the issues and opportunities for providing users of systematic papers with full on-line access. A discussion paper has been circulated separately to SASB members. Editors, authors, publishers, and anyone with an interest in digital publishing is invited to contact the convenor.

* * * *

5th Conference on the Biodiversity and Conservation of Invertebrates
1 - 4 December 2001
Adelaide University
www.waite.adelaide.edu.au/bio2001/

Provisional Symposia:

1. Rarity & sampling in invertebrate communities
2. Impact of invasive species
3. Invertebrate biodiversity of the arid zone and ephemeral waters
4. Marine invertebrate biodiversity
5. Molecular tools in invertebrate conservation
6. Legislation & education

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For further information please contact the Organising Committee and consult the conference website for additional information and regular updates.

Glow worm tours

Over the summer period, the Tasmanian Parks and Wildlife Service offer a free Summer Activities program. I was lucky enough to run the program at Mt Field National Park in 2000/01. Many people come to the park to bushwalk, camp and to see the plants and animals. I organised one activity that was particularly successful: a night walk to Russell Falls to see the glow worms (*Arachnocampa tasmaniensis*). Other fascinating invertebrates to see along the way were harvestmen (Opiliones), predatory carabid beetles like *Notonomus* sp., flatworms, funnelweb spiders, scorpions and crickets. Many of the beetles are dark in colour, which is great camouflage for protecting them at night from insectivorous mammals. The glow worms are spectacular at Russell Falls because you can get right up close to them and in some areas you can see the glass bead-like mucilaginous traps these fly larvae build to catch their prey. For all lovers of invertebrates this is a magical place to see them active at night and many of the people who came on this night journey to the falls walked away with a better understanding and appreciation for the little creatures which are so important to the forest ecosystem.

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The worth of a bird?

The *Orange-bellied Parrot Recovery Plan 1998-2002*, published by DPIWE in 1999, asks for spending of $5,451,600 over six years to achieve specified conservation goals for this threatened species (see **http://home.vicnet.net.au/~birdsaus/birds/downloads/obprplan.pdf**). According to the *Action Plan for Australian Birds* (2000), there are currently 180 mature orange-bellied parrots whose breeding needs to be encouraged.

That works out to $5048 per bird per year.

Good news, bad news

In *Invertebrata* 9 (November 1997) we passed on the good news that the land snail *Austrochloritis victoriae* had been found alive and well on King Island. The species also occurs in southern Victoria, but had been 'presumed to be extinct' in Tasmania because the last King Island collection was in about 1920. In 1996, *A. victoriae* was found in tall tea-tree and *Banksia* scrub in the Lavinia Nature Reserve.

The bad news is that the whole of the Lavinia Nature Reserve was burned out in a fire in January. Unusually for King Island, the fire was started by lightning strikes.

Fire in the Reserve isn't really news. There have been seven wildfires there in the past 30 years (according to the *Lavinia Nature Reserve Management Plan 2000*, p. 24; **www.parks.tas.gov.au/publicat/tech/lavinia/lavinia.pdf**), including an all-of-Reserve one in 1972.

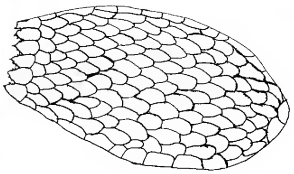
..and how old is it?

There's a lovely SEM image of a test of *Euglypha tuberculata* in:

Porter, S.M. and Knoll, A.H. 2000. Testate amoebae in the Neoproterozoic Era: evidence from vase-shaped microfossils in the Chuar Group, Grand Canyon. *Paleobiology* 26: 360-385.

Something like *E. tuberculata* was apparently washed into a 'quiet marine embayment' at least 740 million years ago, then fossilised.

What is it?



Kevin Bonham's creature (above) in last November's Invertebrata *is an amoeba in the genus* Euglypha, *according to Noel Hynes (University of Waterloo, Ontario, Canada), Peter Tyler (Deakin University) and Leigh Winsor (James Cook University). Leigh writes:*

From the illustration of the beasties found inside the umbilicus of the snail *Pasmaditta jungermanniae*, I am confident that they are freshwater testate amoebae, probably *Euglypha* sp. cf. *tuberculata* (Sarcodina: Rhizopodea: Filosia: Gromida: Euglyphacea: Euglyphidae).

E. tuberculata has a shell length of 45-100 μm, width 24-50 μm, diameter of aperture 10-20 μm, shell plates length 10-16 μm, apertural plates length 10.8-15.1 μm, and width 8.0-10.2 μm. Description: The shell is ovoid, circular in transverse section and is composed of approximately 100 oval, shell plates. The aperture is circular and surrounded by eight to 12 oval, apertural plates. The apertural plates are barely thickened at the denticulate margin, and have a small triangular median tooth with either four or five smaller, lateral teeth. The geographical distribution appears to be fairly cosmopolitan and includes Antarctica and Australia.

Obviously the SEM pics will show far more detail than your line drawing, and on this basis the ID can be refined. For example, the illustration suggests there are more body plates than in *E. tuberculata*.

For more information, see

Ogden, C.G., and Hedley, R.H. 1980. *An atlas of freshwater testate amoebae.* British Museum (Natural History): Oxford University Press.

This work contains an overview of the biology and ecology, plus descriptions and lovely SEM illustrations. According to this work, the distribution of testate amoebae in soil seems to be determined largely by the size of the pore spaces and thickness of the soil water film, although they are usually more numerous in soils having a high organic rather than a high mineral content.

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Invertebrate politics: *Anoglypta*

The Northeast land snail *Anoglypta launcestonensis* was listed as 'vulnerable' in schedule 4 of the Tasmanian *Threatened Species Protection Act 1995*. When de-listing was proposed in 1998, the Launceston Environment Centre formally objected (see *Invertebrata* 13), and Green groups began a campaign in opposition to de-listing. The campaign included personal attacks on Kevin Bonham (*Invertebrata* 14), the specialist who had carried out the principal field study on the distribution and abundance of *Anoglypta*.

In early 1999, de-listing was recommended by the Scientific Advisory Committee (SAC) established under the 1995 Act, and the recommendation was accepted by David Llewellyn, the responsible Minister (Primary Industry, Water & Environment). The *Tasmanian Conservationist*, newsletter of the Tasmanian Conservation Trust, published an article by Rod Knight which was strongly critical of both SAC's recommendation and the Bonham report on which the recommendation was largely based. Knight's article can be seen on the Web: **www. tct.org.au/nl4h.htm**

On 8 September 1999, Llewellyn announced in the Tasmanian Government Gazette and the State's three daily newspapers that *Anoglypta* had been removed from schedule 4. The TCT quickly appealed the de-listing on the grounds that SAC had incorrectly advised the Minister that *Anoglypta* was listed in schedule 5 ('rare'), not schedule 4 ('vulnerable'). Argument was heard on 25 October 1999 by the Resource Management and Planning Appeal Tribunal (RMPAT), which decided that the error did not invalidate the Minister's action. RMPAT's record of the appeal can be found at:
www.rmpat.tas.gov.au/decisions/j20099.htm

The TCT then lodged a more substantial appeal against the de-listing on what the TCT argued were scientific grounds. The cases for and against were presented on 30 and 31 March 2000 and have been summarised at:
www.rmpat.tas.gov.au/decisions/00j55.htm

On 19 April 2000, RMPAT dismissed the appeal:

> *Upon all of the evidence before the Tribunal, the Tribunal is satisfied that whatever precise biological and habitat factors remain unknown, the fact that* Anoglypta *has survived in the locations where it has been found, over what is on the evidence many thousands of years, means that those areas are adequate to support it; and that the extent of population and the nature of the habitat, particularly the reserved habitat, mean that one could not conclude on the present evidence that there is any threat, present or imminent, which places* Anoglypta *in danger of extinction or likely to become in danger of extinction. The Tribunal therefore finds that* Anoglypta *is not eligible to be listed as vulnerable under Section 15(3) of the Act.*

Green supporters were unhappy with the decision, and the *Tasmanian Conservationist* published an article critical of the RMPAT process, again by Rod Knight, under the title: *450,000 dead snails – Tribunal rules against vulnerable species*:
www.tct.org.au/n10g.htm

Tasmanian Green MHA Peg Putt went further, suggesting in a media statement that the SAC Chairman was biased. The Chairman subsequently resigned.

Environmental activists in the Northeast still refer to *A. launcestonensis* as a 'threatened species'. Its range includes native forest which has been targeted for conversion to pine plantation, and the snail will undoubtedly remain 'vulnerable' to Green political use for years to come.

Bob Mesibov

A snail training course

No, this was not a training course for snails, but a training course I ran for scientists of the Australian Quarantine and Inspection Service (AQIS) on how to identify the different sorts of snails that are intercepted in Australian ports and airports every day. The course was held on February 7-9 this year in Bendigo. (I am a Research Associate at both the Queen Victoria Museum and at the Bendigo campus of Latrobe University. Although I now live in central Victoria, I come back to Launceston about every six weeks or so to continue work on the QVM collections.)

Twelve quarantine officers came from all the major ports in Australia (from Darwin to Perth and all the major east coast ports) and were joined by two officers from the policy office of AQIS in Canberra for three solid days of snail identification. The participants were primarily trained as entomologists, as most animals intercepted at points of entry are insects. However, snails and slugs are an increasingly important component of the interceptions by the quarantine inspectors.

The participants were given an overview of the general biology of non-marine molluscs and were then exposed to a wide range of named specimens to give them an idea of the diversity within the group. It was a lively three days culminating in an 'examination' where the group was given a series of unknowns to identify. This occupied an entire morning and was taken very seriously because the top two in the class won a bottle of wine each. Reputations and the prestige of the different ports were also very much at stake.

All in all it was a very busy and mentally exhausting three days. The participants appeared to have learned quite a bit about identifying non-marine molluscs and the three 'sponsoring institutions came away with an enhanced reputation for excellence in this highly specialized field. The Bendigo campus of Latrobe University provided a very comfortable venue for the workshop; the Melbourne Museum collections were the source of the bulk of the demonstration material; and the Queen Victoria Museum was seen as my home institution and also provided some reference material and the facilities for producing the workshop manual for the course.

Later this year, I will be compiling a reference CD-ROM based on an identification key to the common molluscs encountered by quarantine in Australia. This will be used throughout Australia by the quarantine service to assist in their vital role of safe-guarding Australian primary industry and its unique biodiversity.

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Ptunarra Brown Butterfly Project

During 2000 I began an Honours project in the School of Geography and Environmental Studies under the guidance of Dr Peter McQuillan. The main focus of my study has been *Oreixenica ptunarra*, the Ptunarra Brown Butterfly, which is listed as 'vulnerable' in the schedules of the Tasmanian *Threatened Species Protection Act 1995*. The following is a summary of the first half of my project.

Captive rearing studies

The fecundity of captured females has been studied. Female *O. ptunarra* were found to mate only once and to lay 20-30 eggs singly over three to seven days. This result has significant implications for population viability, and further work on population dynamics is planned for 2001.

An ongoing study of the size ratio of the egg to the female body has commenced comparing different species within Nymphalidae. In my Honours project I am capturing fresh females of Tasmanian Browns (Nymphalidae family) and keeping them in breeding containers, then counting the number of eggs laid during the remaining life of the butterfly. I have been weighing and measuring the eggs and the butterflies to determine the egg-to-female-body size ratios. I am also recording the incubation period for each species.

I would greatly appreciate any assistance from butterfly enthusiasts with the capture and rearing of female Tasmanian Brown butterflies.

Oreixenica ptunarra Couchman
From a painting by Julie Virtue in *Butterflies of Tasmania*, Tasmanian Field Naturalists Club Inc., Hobart, 1994.
Reproduced with permission of the artist.

Jewel beetles

A forthcoming book by David Cowie on Tasmania's jewel beetles was noticed in *Invertebrata* 17. The Tasmanian Field Naturalists Club Inc. (publishers) advise that the book should be on sale in May.

Phenotypic variation in O. ptunarra *as influenced by altitude*

A study of the influence of altitude on phenotypic variation in *O. ptunarra* has found that there is a gradational change in wing colouration. Female *O. ptunarra* from higher altitudes are predominantly lighter in colour than their counterparts from lower altitudes. Male *O. ptunarra* from higher altitudes, in contrast, are predominately darker in colour than their counterparts from lower altitudes. The results of this study were presented at the Ecological Society of Australia's annual conference in Melbourne last December.

Landuse management in and around O. ptunarra *habitat*

A detailed study of landuse management in and around *O. ptunarra* habitat in the Southern Midlands region of Tasmania has been conducted this year. An ArcView GIS program to assist with managing *O. ptunarra* sites in the Southern Midlands was also developed. A summary of the findings from this study is available and has been distributed to land managers in the Southern Midlands Region.

Threatened Species Network Community Grant

A grant from the Threatened Species Network was awarded for the project 'Conserving the Rare Ptunarra Brown Butterfly on Farmland'. The project application was completed with the cooperation of the Midlands Tree Committee. The main focus of the project is to enhance and restore key habitats in the Southern Midlands area using local community help. Various farmer-oriented approaches to conserving *O. ptunarra* will be demonstrated, including translocation, strategic fencing, fire management and the propagation of grassland corridors to connect remnants. Some of the work has commenced but most will be carried out during 2001.

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More information:

Anderson, R.A.L. 2000. Landuse management of and surrounding *Oreixenica ptunarra* – Ptunarra Brown Butterfly Sites in the Southern Midlands Region of Tasmania (Full Report). Hobart: School of Geography and Environmental Studies, University of Tasmania.

Bell, P. 1998. *The ptunarra brown butterfly* Oreixenica ptunarra *Recovery Plan 1998-2003*. Hobart: Nature Conservation Branch, Parks and Wildlife Service, Tasmania.

Bryant, S. and Jackson, J. 1999. *Tasmania's Threatened Fauna Handbook*. Hobart: Threatened Species Unit, Parks and Wildlife Service, Tasmania.

Department of Primary Industries, Water and the Environment (DPIWE). *Ptunarra Brown Butterfly: managing native grassland for a threatened Tasmanian Butterfly*. (Brochure, publication date unknown.)

Neyland, M.G. 1992. *The Ptunarra Brown Butterfly* Oreixenica ptunarra. *Conservation Research Statement*. Australian National Parks and Wildlife Service, Endangered Species Project No. 3. Canberra: ANPWS.

Neyland, M.G. 1993. The ecology and conservation management of the ptunarra brown butterfly *Oreixenica ptunarra* (Lepidoptera; Nymphalidae; Satyrinae) in Tasmania, Australia. *Papers and Proceedings of the Royal Society of Tasmania* 127: 43-48.

Austral conifer entomofauna

Tasmania's rich flora of Southern Hemisphere conifers is host to an unusual insect fauna, some of whose members are highly host-specific. I have been examining the community structure of this fauna and making comparisons across host trees with the aim of identifying recurrent patterns and correlations with factors such as host age, geographical distribution, architecture and terpenoid profiles. The work was begun as an Honours project supervised by Dr Peter McQuillan in the School of Geography and Environmental Studies, University of Tasmania.

After extensive fieldwork, a dataset has been assembled of about 150 invertebrate taxa (excluding predators) across 10 species of austral conifers. On preliminary results, *Phyllocladus* (celery-top pine) is the most species-poor host, despite being the most widespread conifer in modern-day Tasmania, whereas some (now) very restricted conifers such as *Lagarostrobos* (Huon pine) and *Microstrobos* are relatively well endowed with insect associates. We are also examining the fossil distribution of host genera to see if there is any residual influence.

While various common herbivores are somewhat polyphagous (e.g. *Merimnetes* weevils, *Aka* cixiid bugs), others are highly host-specific (e.g. scale insects, *Chrysorthenches* moths, archiearine moths). Initial multivariate analysis shows that there is a strong split in the invertebrate communities on Cupressaceae (*Callitris, Diselma, Athrotaxis*) and Podocarpaceae (*Lagarostrobos, Podocarpus, Phyllocladus, Microstrobos, Microcachrys*), and strong conservation of community structure between related host species (e.g. *A. cupressoides*/*A. selaginoides* (pencil pine/King Billy pine), and *C. oblonga*/*C. rhomboidea* (South Esk pine/Oyster Bay pine)).

Conifers differ strongly in their terpenoid profiles, but not in ways that relate clearly to the distribution of insects (see diagram below). The simple profile of *Callitris oblonga* contrasts with that of the biochemically well-endowed congener *C. rhomboidea*, but there is little difference in their insect communities.

Data has also been collected on spiders to test if host patterns exist and relationships sought with plant architecture and potential prey density. *Phyllocladus* has the poorest spider fauna but it is impossible to tell if this is due to its simple architecture or its low prey density. Energy-efficient sedentary spiders such as *Diaea* are important predators in the coldest environments.

Comparisons will be made with published information on invertebrate communities typical of conifers elsewhere.

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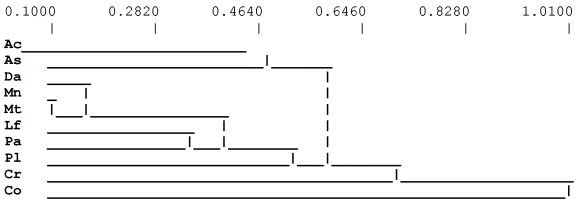

Relationship (UPGMA) between Tasmanian conifers based on terpenoid profiles (presence/absence). Conifer code:

Ac = *Athrotaxis cupressoides*
As = *Athrotaxis selaginoides*
Da = *Diselma archeri*
Mn = *Microstrobos niphophilus*
Mt = *Microcachrys tetragona*
Lf = *Lagarostrobos franklinii*
Pa = *Phyllocladus aspleniifolius*
Cr = *Callitris rhomboidea*
Co = *Callitris oblonga*

Notices & reviews

Shattuck, Steven O. 1999. *Australian Ants: Their Biology and Identification. Monographs on Invertebrate Taxonomy, Volume 3.* Collingwood (Vic.): CSIRO Publishing; 226 pp. ISBN 0 643 06032 4.

'One of the most noticeable things about Australian ants is the large number of species and individuals found at most locations, especially in the arid zones...This great abundance, combined with their predatory, scavenging and seed feeding behaviour, makes them one of the most important groups of terrestrial animals in Australia.'

I have long been on the lookout for a comprehensive guide to the ant fauna of Australia. *Australian Ants: Their Biology and Identification* provides an introduction for the non-specialists and I highly recommend this book to anyone interested in these important insects.

This manual provides an overview of all 103 ant genera known to occur on mainland Australia, Tasmania and nearby islands and also contains information on their general biology, distribution patterns, and an overview of their life cycles, nesting and feeding habits.

There is a key to the subfamilies of ants, followed by keys to the genera of each subfamily. The keys are well illustrated at every step with line drawings. However, the small size of many species means that a microscope capable of 20x to 50x magnification is required with a higher magnification desirable in a number of cases. A minimum of technical language is used throughout the book, with a glossary to explain technical terms.

The chapters on each genus include descriptions of the characters used to identify the genus and to separate it from similar genera, illustrations using scanning electron micrographs to show overall appearance, an overview of the biology of each genera, location maps showing where the genus has been found, a list of described species and a summary of the more important publications dealing with each genus.

Sarah Lloyd
Central North Field Naturalists

[Believe it or not, there's an online bookstore which only sells books on ants:

www.myrmecology.org/mac/sb.htm

Last time I checked, Shattuck's excellent book wasn't listed there. You can get Australian Ants *direct from the publishers:*

CSIRO Publishing
PO Box 1139
Collingwood VIC 3066
Ph (03) 9662 7666
sales@publish.csiro.au

-Ed.]

(Some) University of Tasmania Invertebrate Research Projects

As promised in *Invertebrata* 18, we present here a list of (some of) the invertebrate research projects being carried out by students at the University of Tasmania. *Invertebrata* is grateful to Dr Alastair Richardson for the Zoology list and to Marie Yee for the CRC list and a partial update of information on the Geography and Environmental Studies website. Please note that some of the projects may have been completed and are no longer current, and that some past and most current Honours projects are not included. We were unsuccessful in our attempt to get project information from the School of Aquaculture and the Institute of Antarctic and Southern Ocean Studies (IASOS). Results from projects in bold type have been reported (or at least noted) in *Invertebrata*. For further information, please contact the faculty members listed.

Student	*Degree*	*Supervisor*	*Project*
School of Zoology:			
Jane Andrew	MSc	R. Swain	Taxonomy and biogeography of *Anaspides*
Sue Baker	PhD	A. Richardson	Edge effects and forest litter beetles
Fabienne Cazassus	MSc	D. Ritz	Zooplankton of coastal inshore waters
Arthur Clarke	MSc	A. Richardson	Invertebrate biospace in SE Tasmanian caves
Piers Dunstan	PhD	C. Johnson	Spatial dynamics of marine fouling communities
William Elvey	PhD	P. Davies, L. Barmuta	Impacts of brown trout on stream invertebrates
Brad Evans	PhD	R. White	Molecular genetics of abalone
Stewart Frusher	PhD	R. White	Growth of southern rock lobster
Brita Hansen	PhD	A. Richardson	**Taxonomy and biogeography of *Parastacoides***
Jeff Meggs	MSc	A. Richardson	Modelling stag beetle habitat for conservation
Alice Morris	MSc	C. Johnson	Fertilisation and recruitment in *Asterias amurensis*
Matthew Nelson	PhD	D. Ritz	Southern rock lobster nutrition
Hugh Pederson	PhD	C. Johnson	Interactions between algae and sea urchins
Rebecca Pinto	MSc	P. Davies	Ecology of stream invertebrates
Jeff Ross	PhD	C. Johnson	Impacts of *Asterias amurensis* on benthic invertebrates
David Tarbath	MSc	R. White	Management of the abalone fishery
Derek Turnbull	PhD	L. Barmuta	Predation ecology of stream invertebrates
Danielle Warfe	PhD	L. Barmuta	Predator-prey interactions in freshwater weed beds
Philippe Ziegler	PhD	C. Johnson	Catchability of southern rock lobster
Jason Beard	Hons (2/00)	R. White	Aging methods for blacklip abalone
Philippa Cohen	Hons (2/00)	D. Ritz	Chemical ecology of seahorses and mysids
Christopher Jarvis	Hons (2/00)	D. Ritz	Relatedness, swarming and homing behaviour of mysids
Giles Matthews	Hons (2/00)	S. Jones	Imposex in whelks
Zoe Tanner	Hons (2/00)	A. Richardson	**Ecological impacts of lyrebirds in Tasmania**
Kate Turner	Hons (2/00)	R. Swain	Identifying the onset of maturity of male rock lobster
Thomas Sloane	Hons (8/00)	A. Richardson	Biogeography of dytiscid water beetles in eastern Tasmania
Matthew Webb	Hons (8/00)	A. Richardson	Movement patterns and habitat use of *Astacopsis gouldi*
School of Geography and Environmental Studies:			
Kevin Bonham	PhD	P. McQuillan	**Biogeography of Tasmanian land snails**
Helen Dunn	PhD	P. McQuillan	Conservation of West Coast stream invertebrates
Andrew Hingston	PhD	P. McQuillan	Pollination ecology of Tasmanian blue gum
Michael MacDonald	PhD	J. Kirkpatrick	Birds, reptiles and invertebrates in vegetation remnants
Stephen Mallick	PhD	P. McQuillan	**Honeybee impacts in the World Heritage Area**
Karyl Michaels	PhD	P. McQuillan	Conservation ecology of carabid beetles
Catherine Young	PhD	P. McQuillan	**Taxonomy and ecology of geometrid moths**
Rachel Anderson	Hons	P. McQuillan	**Conservation biology of *Oreixenica ptunarra***
Belinda Yaxley	Hons	P. McQuillan	**Insects associated with native pines in Tasmania**
School of Agricultural Science/CRC for Sustainable Production Forestry:			
Howlett, B.	PhD	J. Madden, T. Clarke, D. deLittle	*Chrysophtharta bimaculata* oviposition
Nahrung, H.	PhD	G. Allen	Biology and phenology of *Chrysophtharta agricola*
Potter, K.J.B.	PhD	G. Allen, J. Ireson	Establishment and efficacy of ragwort flea beetle
Rapley, L.P.	PhD	G. Allen, B. Potts	Genetics of susceptibility of eucalypts to insect attack
Redgrove, H.	PhD	G. Allen, M. Hurley, P. McQuillan, D. deLittle, J. Elek	Melolonthine beetle damage in *E. nitens* plantations
Rice, A.D.	PhD	G. Allen	Larval parasitoids of *Chrysophtharta agricola*
Simmul, T.L.	PhD	G. Allen, D. deLittle	Biology of fireblight beetle, defoliator of *Acacia dealbata*
Yee, M.	PhD	C. Mohammed, A. Richardson, R. Taylor, P. McQuillan, G. Allen	Saproxylic insects and wood decay fungi
Davies, J.	Hons	G. Allen, M. Williams	Ecology of eriophyid mites on Tasmanian blackberries
Lang, M.	Hons	G. Allen, B. Horton	Use of possum carrion by fly-strike blowflies

Invertebrates in the media

The curious case of the phantom peripatus

As noted in *Invertebrata* 18, a State Government media release dated 5 October 2000 announced the purchase of 880 ha of buttongrass moorland at Seventeen Mile Plain in the far Northwest. The purchase was funded by the National Reserve System Program and complemented the purchase under the Private Forest Reserves Program (PFRP) of the adjoining 1120 ha of forest, including oldgrowth *E. brookeriana* forest. The media release added that the site was habitat for '*several significant invertebrate species.*'

On 22 November 2000, PFRP organised a media day on-site at Seventeen Mile Plain. ABC Radio was on hand and reporter Merian Ellis taped interviews which were broadcast on *The Country Hour* the following day. The following transcript was prepared from an audio tape kindly provided by ABC Radio:

(segue from interview with Ian Household)

***ABC**: I'm standing right at the bottom of a huge big tree which I believe is a* Eucalyptus brookeriana, *and with me is Steve Casey, who is a botanist with the Department of Primary Industries. Steve, can you just tell me a little bit about the* brookeriana, *and why it's so special?*

***Casey**: Basically, the* brookeriana *is a swamp forest tree that's found in a disjunct distribution in Tasmania and also parts of southern Victoria. The stronghold's the Northwest Coast, and it has outliers on the East Coast in some of the sheltered gullies. The stronghold in the Northwest is in this far Woolnorth region where a lot of the areas have been basically cleared for agriculture and also more recently for plantations. This area of Seventeen Mile Plain is fringed by large areas of oldgrowth* brookeriana *forest and basically this is the largest intact extent of* Eucalyptus brookeriana *oldgrowth forest in Tasmania.*

***ABC**: So...and it's also because of the* brookeriana *that this area has been made a private forest reserve?*

***Casey**: That's right, under the RFA we were looking at trying to reserve 15% of pre-1750 vegetation types.*

***ABC**: Now you're talking about pre-1750, what would this great big whopper here be, do you think? When would it have come up?*

***Casey**: Oh, I think he'd be coming before 1750, he'd be probably 350 years old.*

***ABC**: They're a magnificent tree, aren't they?*

***Casey**: Oh, they're just beautiful.*

***ABC**: What would be living up there, in the* brookeriana*?*

***Casey**: Well, all through these sorts of forests you've got... It's just great habitat for a lot of the...the raptors, particularly the Grey Goshawk, that tends to nest and shelter in the understorey of the blackwoods that are associated with the* brookeriana *forests. Apart from that, right throughout the extent of the area we've got things like the Northwest Velvet Worm, the Keeled Snail, it's really great habitat for the Western Quoll and other... other mammals through here... and you really need these old-growth forests that have the hollows, that have the broken branches to provide the niches for a lot of these species.*

(segue)

Smith [Dr Steven Smith, PFRP]*: Well, we're deep in the* Eucalyptus brookeriana *forest here with a fantastic dense understorey of ferns and leaf litter and rotting logs and this is the habitat for all sorts of species, interesting species. Within the rotting logs, for example, lives the very rare Northwest Peripatus, or velvet worm. It's one of the... it really is the top predator within a rotting log, and anyway, they've got some amazing habitats, as I said they're a predator, they're a velvety looking body, they can only move fairly slowly but they capture their prey by squirting out jets of glue, which sets fast, traps their prey and they crawl up and inject digestive enzymes into the body of their prey and suck out the contents. They've got pretty interesting sex... sex habits and... and...*

***ABC**: Tell us more.*

***Smith**: The males have... at the height of passion a hook emerges from the top of the head, much to the surprise of the female, and attached to the hook is a packet of sperm, and the male, when they're in close contact, jabs the hook through the skin of the female and injects the packet of sperm into her body that way. That dissolves open and the sperm swims through the body and fertilise the eggs.*

***ABC**: So, kinky sex among the* brookeriana*'s. Is the peripatus one of the reasons why this area has become a forest reserve?*

***Smith**: It's one of... one of the reasons. This kind of forest, as well as being a very unusual forest itself, the* Eucalyptus brookeriana, *is habitat to a wide range of threatened animals, things like the Wedge-Tailed Eagle nests in these tall trees, depends on these tall trees, as does the Grey Goshawk, and... Well, every part of the habitat is important to one form of life or another, and I'm... I'm only just talking about the animals here, because that's my special interest, but the... amongst the plants there are orchids, there are unusual heath plants, and all sorts of... some unusual ferns here as well.*

***ABC**: So what's the future of this area then, what will happen around here, will it be accessible to the general public?*

***Smith**: It is accessible now, although with difficulty. People can walk to it. What we want to do is to formally designate this as a nature reserve and to develop a management plan for it, to make sure that we cater for the needs of the public whilst also protecting the important conservation values that are here. And we haven't really mentioned yet, but adjacent to the Brooker's forest here, the very tall dense forest that we're standing in at the moment, is a magnificent example of buttongrass moorland. As you walk through it... I felt... I used to work a lot down in Southwest Tasmania, near Melaleuca, and I felt like I was down in the Southwest, it's remarkable, seeing all the similar plants. This morning someone disturbed a Ground Parrot there.*

***ABC**: So do you feel like you've caught this area just in time?*

***Smith**: Yes, we're... It's fantastic news, really, for Tasmania to have this reserve established, and particularly for the Northwest Coast. I mean, it's a place people that can be really proud of and enjoy for years* [interview ends].

(continued on p. 9)

(continued from p. 8)

Next, an article on the PFRP by Robbie Gaffney and Esme Atkinson was published in the December, 2000 issue of the Forest Practices Board newsletter, *Forest Practices News*. The article includes the following sentence in a section devoted to Seventeen Mile Plain:

> *This addition to the State Reserve system protects habitat for several rare and threatened fauna species including the keeled snail, Northwest velvet worm, grey goshawk, wedge-tailed eagle, eastern quoll and spotted-tailed quoll.*

It's hard to read the statements by Casey, Smith and Gaffney/Atkinson without concluding that PFRP wants the public to believe that the Northwest velvet worm, *Ooperipatellus cryptus*, is living in the Seventeen Mile Plain reserve-to-be, and that the presence of this species is one of the fauna values of the area.

Nevertheless, there are no records of *O. cryptus* from anywhere within the 2000 ha of Seventeen Mile Plain. In correspondence with the editor of *Invertebrata*, Smith and Gaffney have both said they are aware of the lack of records. Smith hopes that if *O. cryptus* is definitely absent, '*my enthusiasm for invertebrates, the importance of rotting logs to forest ecosystems and raising awareness of the wonderful onychophorans is not held against me!*' Gaffney based his statement on the presence of *O. cryptus* nearby (several kilometres distant) and the apparent suitability of habitat; he looked briefly for the species in the reserve-to-be but failed to find it.

Smith emphatically denies that the presumed presence of *O. cryptus* was one of the reasons for the purchase:

> *'The Private Forest Reserve Program is constrained to protecting (by purchase or covenant) only those forest types that have been identified during the RFA as needing protection outside Crown Land* - E. brookeriana *forest is one of these. No further justification was needed to convince the CAR Scientific Advisory Group or the Advisory Committee to support the proposal. The fact that the forest is also the location of caves with important fossil deposits was a bonus. The fact that the forest is also probably habitat for a wide range of interesting invertebrates and non-vascular plants, and ferns is a further bonus. The fact that an extensive buttongrass moorland/heathland (about 800 ha) could be purchased adjacent to the forest was a further bonus.'*

O. cryptus is currently listed as 'rare' in schedule 5 of the Tasmanian *Threatened Species Protection Act 1995*. In 1997 an application for de-listing the species was made to the Scientific Advisory Committee (SAC) established under the Act. The application argued that the species was more common and wide-ranging than formerly believed, and that it was now known to tolerate clearfelling and burning of its forest habitat. The application was rejected, partly on the grounds that portions of the *O. cryptus* range are to be converted from native forest to plantation.

A paper soon to appear in the journal *Forest Ecology and Management* reports that *O. cryptus* occurs in both pine and eucalypt plantations, and is no harder to find in plantations than in nearby native forest. A second application for de-listing has been made to SAC. *Invertebrata* has been advised that SAC will make a recommendation on de-listing before the end of May.

PFRP advises that it currently has no plans to search for *O. cryptus* in the 2000 ha of Seventeen Mile Plain, but would welcome others doing so.

The grass is always greener

As a snail specialist, I am more than a little envious of the arthropodologists who seem to have an endless supply of useful, minutely variable, species-specific characters to play with. There always seems to be rows of bristles, crucial anastomoses in wing venation or variation in the arrangement of eyes or claws, or something equally accessible, for the arthropod taxonomist to latch on to. Everything seems to be there ready to spot in the external morphology of the beast and all the arthropod worker has to do is to notice it and there is a clear, distinct morphological difference to denote the new species.

In contrast, molluscs have a shell and a soft body. The shell is marginally useful, but it seems to be so phenotypically plastic that many of the characters you spot at first glance, seem to vanish in a haze of intraspecific variation when looked at more closely. The externals of the body bear few useful characters at any level below family, so we are forced to dissect and critical-point dry and then finish up interpreting degrees of 'longness' or 'roughness' of obscure, hard-to-reach, internal organs. Oh! for a few hard and hairy external characters. And slugs are even worse: there are no shells to help and you have to start chopping up as a first resort. I guess I should be thankful I don't work on the taxonomy of flatworms where the only acceptable technique seems to be serial sectioning, which God forbid.

Do other specialists suffer from character envy, I wonder?

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The Weird and Wonderful Box

The Invertebrates are '*one of the* [San Francisco] *Bay Area's oldest continuously operating unknown bands*,' having formed in 1980. The *Invertebrates* website offers background on the band and the personnel, *Invertebrates* graphics, a discography with lyrics plus mp3 tracks from *Garagezilla* and earlier albums:

www.ecsd.com/~mordecai/spineless/index.html

The band's logo is a human spinal column and pelvis, negated:

World Heritage Area invertebrate projects

Impacts of lyrebirds

Zoe Tanner completed an Honours study, supported in part by the WHA Fauna Program, on the ecological impacts of the superb lyrebird (*Menura novaehollandiae*) in Tasmania. About 20 lyrebirds were introduced to Tasmania in the 1930s and 1940s, and the study revealed that numbers have increased to occupy most of the available habitat in the State.

The WHA encompasses much of the lyrebird's suitable habitat, which consists of rainforest, mixed forest and wet sclerophyll. Lyrebirds scratch in the soil with their powerful claws in order to obtain their food, invertebrates. The study found that groundfern and sapling numbers are likely to be decreased by this activity. This potentially has an impact on the invertebrates relying on these habitats for food and shelter. It is not yet known whether lyrebirds have a direct effect on invertebrates through predation or physical damage from the claws, or an indirect effect through altering the soil and litter layers. This aspect was examined by comparing invertebrate abundance and diversity within exclosures (free from lyrebirds) to areas where lyrebirds were free to feed.

Due to the short nature of Honours projects, results were limited. However, after three months of exclosures being in place, superfamily Staphylinoidea was found to be significantly more abundant in the habitat protected from lyrebirds. This experiment is still operating (under the WHA Zoologist), and will be sampled for invertebrate abundance and diversity again in May 2001.

Impacts of commercial honeybees on leatherwood forests

A four-year PhD study by Stephen Mallick into the impact of commercial honeybees on leatherwood forests was completed in December 2000. The study has shown that commercial honeybees decrease the amount of available nectar and pollen adjacent to hives. However, there was no apparent effect on native invertebrates that also use these resources, or on the reproductive performance of leatherwood. This is believed to be due to the high production of nectar and low natural abundance of native invertebrates at some sites. However, there may be potential for impacts in some places where native invertebrate numbers are high.

Cave fauna management

In August 2000, a two-year, monthly monitoring program of cave fauna was completed for Exit and Mystery Creek Caves. The purpose of this monitoring was to obtain baseline data on the status of cave fauna populations, including several threatened species and the spectacular glowworm displays. This information will be used to compare against future impacts, such as increased recreational cave use and tourism. The study will also provide important information on the life history of several species that will form part of the basis for their future management. The data collected is in the process of being analysed and written up.

A report on the management of cave fauna in Mole Creek Karst National Park by Stefan Eberhard was published. The aim of this study was to identify locations of rare and sensitive habitats and species, to provide recommendations on the conservation status of cave fauna species, and to develop management options for the protection of cave fauna. One of the notable findings of the study was the discovery of three threatened species (cave pseudoscorpion, cave harvestman and cave beetle) occurring within a national park. In the case of the cave beetle, this may lead to a downlisting of its conservation status from vulnerable to rare.

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Notices & reviews

Brunet, B. 2000. *Australian Insects - A Natural History.* Frenchs Forest (NSW): New Holland Publishers; 288 pp. ISBN 1876334436.

Wherever you open this volume, your attention is immediately caught by the colourful glossy photos. In fact, there is hardly a page without at least one photograph.

The main body of the text is divided into two parts – 'The Lives of Insects' and 'Australian Insects'. In part 1, the five chapters are entitled 'An Insect's Body', 'Life Cycles', 'Wings and Flight', 'Behaviour and Survival', and 'Habits and Habitats'. Each chapter opens with a general discussion of its topic, followed by a section entitled 'Diversity Among the Groups' in which features typifying the major orders are described. These chapters present an extensive review of how insects function and the ecological roles that they fill. The final chapter of this part offers simple, practical advice on aspects of specimen collection and preservation, recording of observations and photography.

In part 2, 'Australian Insects', the final four chapters respectively cover 'Pseudo Insects' (orders Collembola, Protura and Diplura), 'Primitive Wingless Insects', 'Primitive Winged Insects' and 'Modern Winged Insects'. Each chapter presents basic information regarding the physical forms and habits of insect groups occurring in Australia to enable identification of specimens to order or in some cases to family.

For budding entomologists who love numbers, Appendices 1 and 2 present statistics on the numbers of insect families and species known in Australia and from the rest of the world. Appendix 3 presents a list entitled 'Unwanted Insects in Australia' which highlights the hazards (particularly to agriculture) of exotic insects, although it isn't always clear whether the species in question is already known to be in Australia.

At 288 pages including appendices, glossary, bibliography and index, the book has necessarily been very selective in covering such a huge subject but it presents information in a readily accessible form without excessive technical jargon. Apart from several typos, the only error I've picked up was under the heading 'Gradual metamorphosis' (p. 59) where 'exopterygote' has been replaced by 'endopterygote'. The text is written in a very readable style, broken up with clear headings, line drawings and silhouettes, as well as colour-boxing.

It's an attractive, friendly volume to read but, as a book for the layman with a price tag of $59.95, I suspect that it will reach more people via lending library shelves than by private book sales.

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